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Experimenting with agricultural diversity: Migrant knowledge as a resource for climate change adaptation

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ABSTRACT

Climate change poses serious challenges for agriculture and adaptation to its impacts is widely understood to be necessary – now and into the future. This paper focuses on Australia's horticulturally productive and culturally diverse Sunraysia region. Due to the high seasonal labour demands of horticulture, this region has a large population of temporary and permanent migrants. Many were farmers in their countries of origin. We bring together literature on climate change adaptation in agriculture, and migration and agriculture, to identify a common theme: experimentation. The former emphasises the need for experimentation in uncertain times, and the latter draws attention to the experimental food growing capacities of migrants. We argue that migrant farmers' desire to grow culturally important crops in their post-migration contexts, alongside their experience with diverse environmental conditions, constitute a poorly recognised adaptive resource. When migrants have access to farmland to demonstrate their agricultural capacities, migration can expand the suite of adaptive options available. This paper draws these experimental threads together, alongside empirical evidence gathered from qualitative research in the Sunraysia region. We conclude by describing an experimental, action-oriented project which seeks to explore what happens when migrant farmers are, quite literally, given the space to show the broader community what they know and what they can do.

1. Introduction

A sizeable body of literature now addresses the need for climate change adaptation in agriculture (Fedoroff et al., 2010; Hayman et al., 2012; Howden et al., 2007). In rural areas of Australia and North America, particularly in horticulturally[1] productive regions with high labour demands, climatic pressures exist alongside pronounced cultural shifts. Such regions are increasingly being 'integrated into 'the global' via international labour migration currents' (Argent and Tonts, 2015:140). Contemporary seasonal and permanent migration flows to rural areas of North America have their origins in South and Central America and the Caribbean; while migrants to rural Australia come from diverse areas of the Majority (developing) World[2]: the Pacific, Asia and Africa. Such trends disrupt long-standing imaginaries of rural whiteness (Askins, 2009; Dufty-Jones, 2014). Yet the implications of rural ethnic diversity for agriculture, in a climate changing world, have received minimal attention. The site of our research – Australia's horticulturally productive Sunraysia region[3] – exemplifies such diversity. One-third of horticulturalists in the region speak a language other than English at home (Missingham et al., 2006). There has been a long history of southern-European migration to the region (Dadswell, 1980; Heslop, 1977), coupled with more recent arrivals from across the globe–many of whom were farmers in their countries of origin. We contend that these migrant farmers constitute an important (but largely untapped) resource for climate change adaptation in agriculture.

This paper brings together two disconnected bodies of literature: that on climate change adaptation in agriculture and that on migration and agriculture. Experimentation is identified as a common theme across both. The former makes a case that experimentation is essential for climate change adaptation in agriculture, while the latter shows that

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[1] Horticulture is a subset of agriculture. We use these terms interchangeably. Our focus is on 'production horticulture', which includes the cultivation of 'fruits, vegetables, flowers, mushrooms, nuts' (McSweeny et al., 2014:1119).

[2] We follow Punch (2000) by using the terms 'Minority World' and 'Majority World' (rather than North/South, developed/developing world, First World/Third World) because they serve as a reminder that wealthy lifestyles are experienced by a minority of the world's population.

[3] The 'Sunraysia region' is ill-defined geographically. However, the term is widely used in public discourse, and is a label that resonates both with residents of the region and with the broader Australian public.

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– when it comes to growing food – migrants are highly adept experimenters. We draw these experimental threads together using empirical interview material from the Sunraysia region, a semi-arid, irrigated horticultural area of Australia.

Our migrant[4] interviewees revealed themselves to be persistent experimenters, motivated by their desire to grow culturally important crops in the distinctive soil and weather conditions of their post-migration context. In this paper, we contend that migration presents opportunities to do things differently. In agricultural contexts, it can offer pockets of diversity – in crops, knowledges and techniques – contributing to a suite of *in situ* food growing experiments that can be drawn upon when needed. The paper stops short of identifying specific solutions for the Sunraysia region in the form of particular crops or techniques introduced by our migrant interviewees, not least because it is often impossible to know what will be adaptive in advance. Instead, we frame our research findings as a call to recognise the possibilities for change that already exist, albeit in a marginalised and frequently unrecognised form, in the knowledges and practices of migrants. We outline our own efforts to make 'space' for such experimentation, through a fledgling action-research project that seeks to provide migrants with access to farmland and, in so doing, to make their food growing expertise visible.

2. Climate change adaptation in agriculture: the importance of farmer-led adaptation and social capital

A range of climate change adaptation strategies has been identified for horticulture: adjustments to planting seasons, crop rotations and crop sequences; changing nutrient, erosion and salinity management strategies; strategies to conserve soil moisture; improved irrigation efficiency and changes in the timing of irrigation; adjustments to fertiliser inputs; and changing crop varieties – for instance, to introduce more drought resistant or heat tolerant varieties (Hayman et al., 2012; Heyhoe et al., 2007; Howden et al., 2007). Crop diversity and mixed-cropping systems have also been recognised as an adaptive resource in contexts of increased climatic variability, as opposed to 'modern' agricultural monocultures (Bardsley and Pech 2012; Eckard et al., 2012; Food and Agriculture Organisation (FAO) 2010; Kandulu et al., 2012). All of these approaches seek to 'adapt to the 'new' climate in the current location' and thus to support continued production *in situ* (Deuter, 2008:2). An alternative adaptation response is to relocate farming activities to a more suitable climatic zone (Hayman et al., 2012; Rickards and Howden, 2012). The financial costs and risks of relocation can be high, as is the degree of social upheaval involved (Hayman et al., 2012).

Climate change adaptation presents enormous challenges at the farm level, and for farming communities. Due to the complexity of climate systems, fine-grained, local-level climate change projections are considered less reliable than those for larger geographical areas (Schiermeier, 2010). In addition, the exact effects of climatic changes on the broad range of horticultural crops in existence are poorly understood – and the extrapolation of such information from other horticultural regions (referred to as spatial analogues) is imperfect (Deuter, 2008; Hayman et al., 2012). At the same time, climate change adaptation in agriculture also needs to pay heed to a whole host of locally specific non-climatic variables and stressors that affect rural communities and landscapes (Garnaut, 2008; Kiem et al., 2010; Rickards and Howden, 2012). With this complexity in mind, several studies have identified the innate adaptive skills and experimental capacities of farmers and the importance of these in uncertain times (Head et al., 2011; Isaac et al., 2007; Kiem and Austin, 2013). Such studies have emphasised that farmers are not mere recipients of adaptation knowledge from upstream sources – they are actively involved in adaptation processes as producers and holders of knowledge (Eriksen et al., 2015; Goulet, 2013). There is growing recognition that successful adaptation strategies will need to be 'learnt in partnership with farmers, many of whom have already demonstrated extraordinary expertise at managing complexity and uncertainty' (Hayman et al., 2012: 211). Given declining public expenditure on agricultural research, development and extension – in Australia, and elsewhere (Eckard et al., 2012; Kiem and Austin, 2013) – experimental adaptation led by farmers is likely to become even more important, and may broaden the suite of available adaptations (Howden et al., 2007).

Building outwards from the capacities of individual farmers, social capital has been identified as a crucial adaptive resource. Social capital, following Putnam (1995: 664–665), refers to 'features of social life – networks, norms and trust – that enable participants to act together more effectively to pursue shared objectives'. Bringing a social capital perspective to the study of climate change adaptation, Adger (2003: 388) argued that societies have inherent adaptive capacities, but that these are 'bound up in their ability to act collectively' (that is, in their social capital). This is particularly so when moments of crisis or adjustment are paired with the 'rolling back of the state' (Adger, 2003: 397), as has been the case in 'modern' agriculture. Dowd et al. (2014) investigated the role of social capital and social networks in supporting adaptive capacity in agricultural contexts, using Putnam's (2000) distinction between bonding social capital (social ties *within* a network) and bridging social capital (social ties *between* networks). They showed that farmers who were engaged in transformational adaptation[5] had fewer within-group ties, and more between-group ties, than did incremental adaptors. Strong within-group ties were found to enforce within-group norms and to result in pressure to conform, potentially leading to insularity and a point where all of the people involved have the same information – 'a state known as redundancy' (Dowd et al., 2014: 560; Isaac et al., 2014). Transformational adaptors sought to build new ties across geographic and industry networks, including through study tours and international farm visits (Dowd et al., 2014). But international study tours are not the only way in which bridging social capital can be introduced into agricultural settings.

Broader studies of social capital (not focused specifically on agriculture) have argued that bridging ties can be fostered through 'associations between people with shared interests or goals but contrasting social identity' – as occurs, for instance, through migration (Pelling and High, 2005: 310). Indeed, migration has been identified as one of the key ways in which 'tacit knowledge moves between regions' (Jensen, 2014:240). Further, migrants may act as a 'circuit breaker for 'group think', which would otherwise limit the way societies approach problems' (Jensen, 2014: 240). A study of Ghanaian cocoa farmers provided a rare empirical example of the importance of migration as a source of bridging social capital – although in that case, the focus was on internal migrants (Isaac et al., 2014). The authors found that the migrants, who had left their home areas due to environmental change, introduced new ideas about agroecosystem management, planting methods and weeding regimes to their post-migration contexts. They noted that the migrant farmers had a 'greater capacity for pro-environmental management' because of their pre-migration agricultural experience in a drier environmental context, and because 'the boundaries of the environmental and social space of migrant farmers are much larger, providing a more expansive toolbox' for innovation (Isaac et al., 2014: 839, 844).

Although research on climate change adaptation in agriculture is increasingly open to acknowledging farmers' expertise, migration has

[4] We use the term 'migrant' to incorporate international migrants (long-term and seasonal) as well as refugees and humanitarian migrants.

[5] Transformational adaptation involves 'large-scale, novel responses to reduce vulnerability to climate change' (Jakku et al., 2016: 557), 'major, purposeful action' (Rickards and Howden, 2012: 240) and the 'creation of fundamentally new systems or processes' (Park et al., 2012: 119; Dowd et al., 2014). At the opposite end of the scale, incremental adaptation generally refers to changes *within* the existing system, rather than overarching modifications (Rickards and Howden, 2012: 243; Jakku et al., 2016).

yet to be thoroughly explored as a potential source of adaptive knowledge. We see this as a missed opportunity. In the following section we review literature on migrants' involvement in agriculture, with a focus on their food growing knowledges and skills, and – crucially – their experimental capacities. Such research provides support for our overarching proposition in this paper: that migrant knowledge expands the portfolio of available options, and thus constitutes an adaptive resource for agriculture in a climate changing world.

3. Growing food: the experimental capacities of migrants

There is a sizeable body of scholarship on migrants and agriculture, particularly stemming from the USA and Canada. The focus of this literature has quite understandably been on the working conditions, exploitation and health of seasonal migrant workers (Holmes, 2013; Preibisch, 2010; Sbicca, 2015). In contrast, relatively little is known about the agricultural knowledges and practices of migrants, and how these take expression in their post-migration contexts. The work that many migrants (both seasonal and permanent) do on farms, including picking and pruning, is typically framed as unskilled work. Yet many migrant farmworkers come from farming backgrounds in their countries of origin and have 'extensive knowledge of food and farming systems' (Minkoff-Zern, 2012: 1190). This resource is currently poorly understood and underutilised.

In Australia, it is well recognised that the imposition of settler (non-Indigenous) agriculture has always been a process of experimentation by new migrants – including those who came from Britain (Meinig, 1962; Powell, 1976, 1989). Existing studies have emphasised historical examples rather than contemporary migration flows. Early research by Price (1963) and Hugo and Menzies (1980) concluded that migrant farmers often quickly adopted the farming practices of their established Anglo-Australian neighbours, due to a combination of government regulations and experiences gained from labouring on their neighbours' farms while saving capital to eventually purchase their own. However, Jordan et al.'s (2009) historical study of Italian migrants who settled in Griffith (NSW), both before and after World War II, found that they came with skills as small-scale farmers. These skills enabled them to bring farms that had been abandoned by Anglo-Australian farmers (due to waterlogging or salt intrusion) back into productivity. Merrill and Pigram (1984) found that migrants from cotton growing regions of the USA (Arizona and California) were instrumental in the development of Australia's irrigated cotton industry in north-western NSW in from the late 1960s, with spill-over effects into other areas of Australian agriculture. They described migration as a 'useful conduit for continued innovation and cultural exchange' (Merrill and Pigram, 1984:127). In another historical example, this time from the USA, Moon (2009) described how the migration of German Mennonite farmers from the Russian steppes to Kansas in the 1870s altered the wheat industry on the Great Plains. Stepping back even further in history, Carney (2001) painstakingly detailed the contributions of West African slaves to the development of the rice industry in the USA, rebutting the common perception that manual labour was the slaves' sole contribution. As revealed by Carney, the variety of rice grown on South Carolina rice plantations, and the controlled field flooding system that was used, both had their origins in the West African mangrove rice system.

More recent examples of migrants' contributions to agricultural knowledge are sparse. Ben-Moshe et al. (2005) recounted anecdotal evidence that Albanian migrants living in Shepparton (Victoria, Australia) introduced plant grafting techniques that shorten the time period required for fruit trees to mature, and noted that these techniques have since been adopted by other farmers in the region (see also Carrington and Marsh, 2008). Collins et al. (2016) asserted that migrant farmers from countries like Zimbabwe and South Africa have brought experience of water-saving techniques with them to Australia. Tsuzuku (2013) found that gardeners, community gardeners and commercial farmers of Japanese descent in Southwest British Colombia (Canada) have incorporated techniques and crops from Japan into their food growing practices post-migration. Finally, in Lisbon (Portugal), Cabannes and Raposo (2013) observed that Cape Verdean migrants who were engaged in peri-urban agriculture contributed to plant diversity through their food growing practices. The migrants showed a strong capacity for experimentation that enabled them to grow culturally valued tropical crops (such as bananas) very successfully in a Mediterranean climate, even on highly marginal land (Cabannes and Raposo, 2013).

A far more extensive body of literature addresses migrants' food growing practices in backyard and community gardens. It is beyond the scope of this paper to review this literature in detail. However, it has shown that migration can contribute to plant diversity and to the mixing and melding, or hybridisation, of crops, techniques and practices learned post-migration with those brought from countries of origin (Head et al., 2004; Minkoff-Zern, 2012; Taylor and Lovell, 2014). The crop diversity introduced by migrants often stems from a desire to grow and consume foods that provide a taste of 'home' (Gichunge and Kidwaro, 2014; Morgan et al., 2005; Moulin-Doos, 2014). Backyard and community gardens thus become important sites for experimentation, in which migrants work (sometimes over many years) to adapt culturally valued foods to local growing conditions.

The two bodies of literature that we have outlined – that on climate change adaptation in agriculture, and that on migrants and agriculture – share a common theme: experimentation. The former, as we have shown, argues that experimentation (with regards to farming practices and crop types) is essential for climate change adaptation in agricultural settings. But it has not identified migrants as a potential resource in this regard. The latter, especially when expanded to include research on community and backyard gardens, explains that migrants are well-practised experimenters, and that they contribute to the diversification of crops and techniques in the process. But it has not given focus to the potentially broader ramifications of migrants' experimental capacities, and the resource that they may provide for agricultural settings challenged by climate change. These are the threads that we seek to draw together in this paper.

4. Research context and methods

Our research in the Sunraysia region has focused around the rural city of Mildura and a smaller nearby town, Robinvale, both of which are located in north-western Victoria on the banks of the Murray River (Figs. 1 and 2). Without climate change mitigation, irrigated agriculture in the Murray-Darling Basin (MDB) ,[6] of which the Sunraysia region is an important part, is predicted to experience a 92 per cent decline by 2100 (or 50% by 2050) due to the increased frequency of drought, decreased median rainfall and a 'near complete absence of runoff' (Garnaut, 2008: 125; Quiggin et al., 2010). Even under various mitigation scenarios, a drying and warming trend is predicted for the region, and major changes will be required (Garnaut, 2008). Many of Australia's key horticultural crops will likely be ill-suited to their present locations over the longer term (Melbourne Sustainable Society Institute (MSSI) 2015). Of particular relevance to the Sunraysia region –70 per cent of Australia's wine-grape growing regions with a Mediterranean climate will be less suitable for growing grapes by 2050 (Hannam, 2015; MSSI, 2015). It is highly probable that crop varieties will need to change over the coming decades, and that the region's perennial plants, such as grape vines and almond trees, will at some point be forced to give way to annual crops that can be left unplanted and unwatered during drought years (Connor et al., 2009, 2012; Kiem and Austin, 2013).

[6] The MDB is often referred to as Australia's food bowl. It produces more than 40% of Australia's gross value of agricultural produce, on 14% of the country's landmass, and accounts for 75 per cent of Australia's irrigated agricultural land (ABS, 2007; Garnaut, 2008).

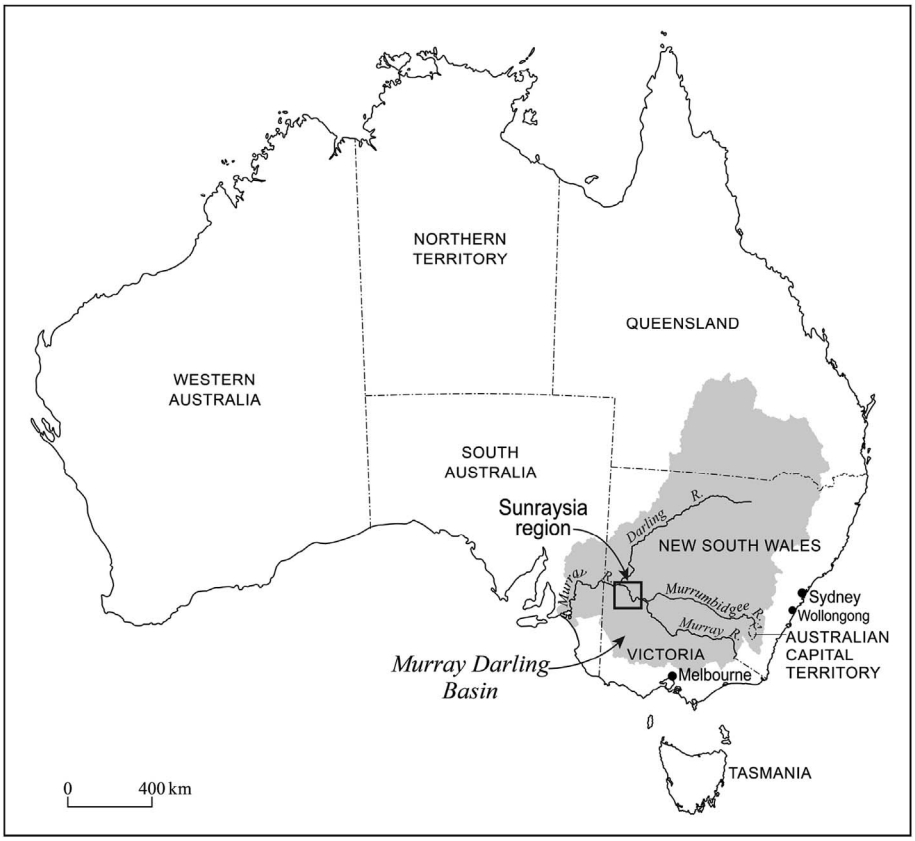
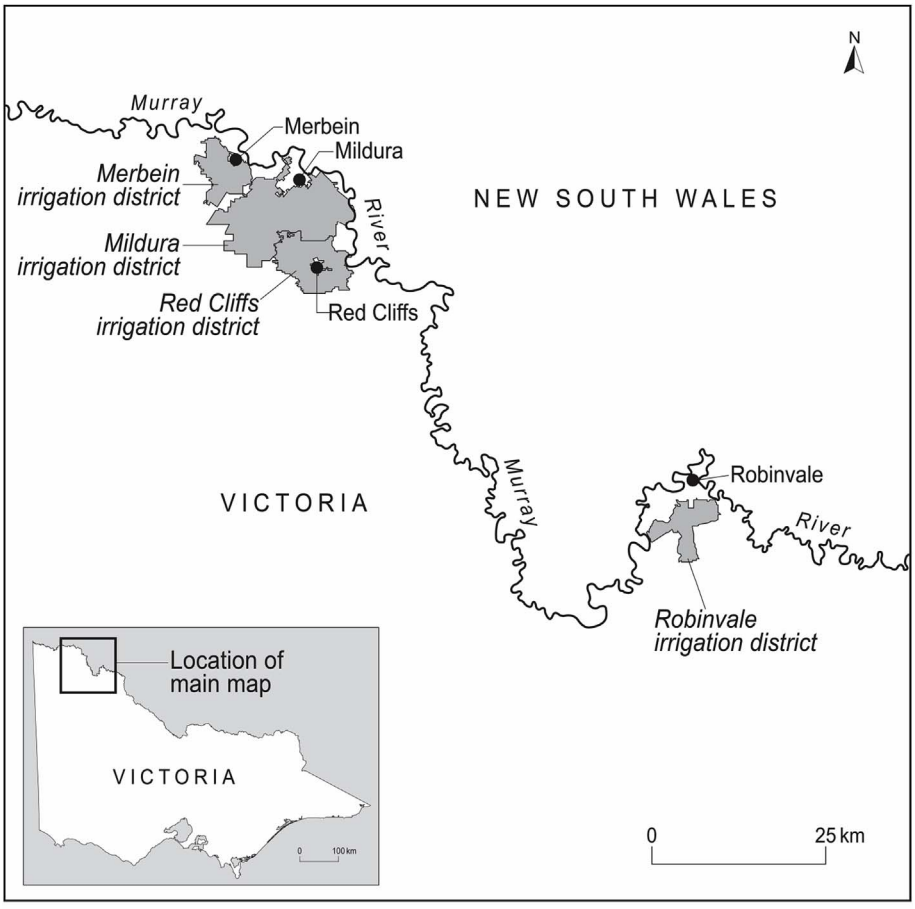


Fig. 1. Map of Australia, indicating the Sunraysia region and the broader Murray-Darling Basin (shaded area). Source: Chandra Jayasuriya, School of Geography, The University of Melbourne.



Source: Information on irrigation district boundaries from Victorian Spatial Datamart, Land Victoria

Fig. 2. Map of Sunraysia region indicating Mildura and Robinvale (inset from Fig. 1). Source: Chandra Jayasuriya, School of Geography, The University of Melbourne.

The Sunraysia region has a highly diverse population. In Robinvale, which had a population of 3,313 at the 2016 Census, just over half of all residents (58.1%) were born in Australia, compared to 66.7 per cent nation-wide (Australian Bureau of Statistics (ABS) 2017a). Further, 13.5 per cent of residents are of Italian ancestry (compared to 3.2% Australia-wide) and 5.9 per cent are of Tongan ancestry (0.1% Australia-wide); 5.2 per cent of residents speak Vietnamese (1.2% nationally) and 8.6 per cent identified as Buddhist (2.4% nationally) (ABS, 2017a). Mildura is substantially larger, with a population of 53,878 in 2016. Italian ancestry was reported by 5.5 per cent of Mildura's residents (3.2% nationwide) (ABS, 2017b). The cultural diversity of the Sunraysia region stems from what Dufty-Jones (2014: 368) has referred to as the 'regionalisation' of immigration policy in many OECD nation-states. In Australia, this has occurred in part through the State-Specific and Regional Migration Scheme, which encourages migrants to settle outside major cities to address concerns with population decline in rural areas, alongside high population growth rates in Sydney and Melbourne (Golebiowska et al., 2016). Refugee populations have also grown in rural and regional Australia, due to a combination of spontaneous and government-directed resettlement (AMES, 2016; Carrington and Marshall, 2008). The expanding Seasonal Worker Programme (SWP), for its part, has contributed temporary migrants to horticultural regions reflecting broader government and industry-led support to actively engage migrant workers in Australia's agricultural sector (Dornan, 2017; Minister for Agriculture and Water Resources and Minister for Employment, 2016; Joint Standing Committee on Migration (JSCM) 2016). The SWP seeks to address the intensive seasonal labour demands of the horticultural sector by bringing Pacific Islanders[7] to live and work in Australia for several months each year – including on the Sunraysia region's almond plantations (Department of Employment, 2016).

Our research in the Sunraysia region is ongoing, having commenced in August 2014. At the time of writing (October 2017) we had conducted 90 interviews and five focus group discussions involving 128 participants in total.. Our interviews have been with first and second generation migrants from diverse countries (Italy, Burundi, Vietnam, Tonga, Solomon Islands, Afghanistan, Turkey, Papua New Guinea, Kiribati, Democratic Republic of Congo, Greece, Slovenia and Nepal), and with established Anglo-Australian farmers. The first stage of recruitment involved meeting with migrant community groups; and interviewing key informants from organisations working with migrants, refugees and/or seasonal workers. This process facilitated contact with migrants, refugees and seasonal workers themselves, with participant recruitment following a snowballing process. Farmers were recruited via the local farmers' market, by directly approaching farms and subsequently via snowballing. Table 1 provides an overview of the number and range of research participants.

Most of our Anglo-Australian and Italian interviewees were established, long-term farm owners in the Sunraysia region (or had owned farms at some time in their lives). None of the more recent migrants (predominantly from the Majority World) owned a farm in the Sunraysia region. Many of the latter were involved in seasonal harvesting and pruning work on other people's farms, and/or had their own backyard food gardens. Many had been farmers in their countries of origin.

Ethics approval was obtained through the University of Wollongong Human Research Ethics Committee. Interviews were generally conducted in participants' homes or in the workplaces of key informants. Where interpretation was necessary, this was either provided by family members (in the case of Italians), or by bilingual co-researchers – that is, community members who were employed to assist with this aspect of the project. The interview schedule was semi-structured and explored the following topics, as relevant: family migration stories and settlement experiences; experiences of agriculture and/or food growing in countries of origin and/or in the Sunraysia region; engagements with the local environment in the Sunraysia region and understandings of climate change and its implications; reflections on agricultural practices brought from countries of origin; and examples of cross-cultural agricultural learning, collaboration and/or conflict in the Sunraysia region. Of particular relevance to this paper, participants were asked whether they were aware of any crops, farming techniques or technologies that had been introduced to the region by migrants.

In accordance with the ethics protocol, interviewees were given the option of being referred to by either their real name or a pseudonym in research publications. Their preferences have been adhered to in this paper. Pseudonyms have been used in cases where interviewees referred to other individuals who were not participants in this study. The remainder of this paper is structured around three research vignettes (Cos, Emeni and Mafu, and Joel). These are supported by shorter quotes from a sizeable number (n = 20) of our other interviewees. Data analysis followed a hermeneutic approach that sought to foreground participants' narratives and meaning-making in regards to their experiences. Using vignettes to structure our findings is consistent with this analytical approach. Vignettes were chosen to reflect dominant themes in the broader dataset: experimentation and visibility – and the related theme of 'learning over the fence'.

Table 1
Project participants.

	Number of interviewees
Key informants	**24**
Current farm owners in the Sunraysia region	**39**
Anglo-Australian	13
Italian background	26
Former farm owners in the Sunraysia region	**24**
Anglo-Australian	9
Italian background	13
Other migrant backgrounds	2
Migrant farm workers in the Sunraysia region	**52**
Resident (current workers)	
Vietnamese	6
Tongan	6
Afghan	1
Resident (former workers)	
Italian	10
Vietnamese	4
Burundian	3
Solomon Islander	1
Cambodian	1
Non-resident (seasonal workers)	
Papua New Guinean	4
i-Kiribati	3
Tongan	13
Backyard food gardeners in the Sunraysia region	**70**
Anglo-Australian	14
Migrant backgrounds	
Italian	28
Vietnamese	7
Tongan	7
Burundian	5
Afghan	4
Solomon Islander	1
Slovenian	1
Turkish	1
Nepalese	1
Congolese	1

Note: There is some double-counting in this table, as many participants fit in more than one category (e.g. farm workers or farm owners who also have backyard food gardens).

[7] Participating countries include: Fiji, Kiribati, Nauru, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu (Department of Employment, 2016).

5. Visible agricultural knowledges: Italian and Greek farmers in the Sunraysia region

Cos's father and uncle migrated from southern Italy to Australia in 1952. Having come from an agricultural background, the men soon headed to Mildura where they found work on grape farms. Once they had saved enough money, they paid the fares for their wives and children to join them. Cos was born in Mildura in the late 1950s. By labouring on established farms, and share farming when opportunities arose, the family saved capital to purchase their own farm in Merbein, which grew over time as they bought-up neighbouring blocks. Cos was an active participant on the family farm as a child. As an adult, he continues to run the farm, growing dried fruits and table grapes.

Our interview with Cos shed light on the important role of farm ownership in the transfer of agricultural knowledge between migrants and established farmers. He described, in vivid detail, how Italian migrants (like his father and uncle) were able to display their agricultural expertise, on their own farms. Through farm ownership, their expertise became visible to Anglo-Australian farmers in the region. The latter observed the Italian migrants' successes, and in turn came to adopt some of their agricultural techniques and technologies:

> The very first year that my dad and my uncle pruned, the neighbour went over because … all they could hear is hack, hack, hack, you know, as in an axe striking a vine, and they're saying, "What, have you guys lost your marbles?" They [Cos' father and uncle] said, "What do you mean?... Dead wood's no good. We'll make way for some new wood." So they had … their own sharp little axes which they brought with them from the Old Country, and they were masters with axes … I can tell you, they were very accurate with their axe strokes. So yeah, so it was a matter of they *did* know what they were doing, they knew how to culture a tree, a vine, reshape it, what have you, and from then on you know, production would rise and did rise … Oh, the neighbours, you know, some of the neighbours … hadn't seen an axe before because the norm was … they would just prune with old coad secateurs … [A]fter a couple of years … they [the Anglo-Australian neighbours] seen the result of the cleaning up and … dad and uncle carting out trailer loads of dead wood … and they seen the results of the new vegetative growth and stuff like that, they asked them to go and clean up their property. So obviously it must have been a tick in the box to say, "Oh, these guys aren't as silly as they look."

Our interview with Cos encapsulated the key points raised by numerous other Italian farmers who recounted how hard work, family relationships and pre-migration experience with agriculture enabled Italian migrants to purchase and successfully run farms in the Sunraysia region. Over time, their innovations (in crops, techniques and technologies) and farming skills contributed to broader shifts in farming practices and crop types in the region. These experiences have been described in extensive detail in Spaven (2016). Cos recounted a number of examples of Italian migrants inventing and introducing new technologies to the region – the Tassone hydraulic weeder, the Morello cane stripper, and a hydraulic rack shaker for dried fruits. He described an innovative vine trellising system that incorporated a 'horizontal T' shape rather than vertical wires, designed to maximise the vines' exposure to sunlight. We were also told of innovations introduced by post-World War I and World War II Italian and Greek migrants to the Sunraysia region during interviews with established Anglo-Australian farmers (thus reflecting their broader uptake). Two Anglo-Australian brothers (Steve and Malcolm), who jointly own and operate a dried fruit property that has been in their family since 1910; and John H., a dried fruit industry development officer (who described himself as 'born and bred on a dried fruit property') explained that Greek migrants introduced revolutionary grape drying techniques to the Sunraysia region in the 1920s. The cold dipping technique[8] enabled growers to produce lighter, golden coloured dried fruits – which are highly prized on the international market. In other interviews, Italian migrant farmers were credited with introducing market vegetables like eggplants to the region; for shifting the region's focus from dried fruits to wine and then table grapes; and for introducing plastic 'raincoats' for grapevines, to protect them from rainfall prior to the harvest, which would cause the fruit to rot. Thus Fiona, an Anglo-Australian olive farmer (who has been on her family property since the 1970s) remarked, 'we're really, really grateful for our high … percentage of Italians and Greeks in this town, the original migrants who have brought us all this amazing food that we'd never heard of, like eggplants'. Fiona's observation mirrored our Italian interviewees' own reflections:

> Potatoes, carrots and broccoli were replaced with capsicums, eggplants, chilies, beans and garlic: I would say that everybody sneak a bit of their own sort of recipes and eventually, you know, it become commercial crops … eggplant, for instance … there weren't too many eggplant in Australia in the early days, but the Italian sort of brought the seeds and then from that seed come other seeds and then it becomes a commercial entity (Don C., Italian wine grape and citrus farmer).

The impact of Southern European migrants on agriculture in the Sunraysia region was broadly acknowledged in our dataset. John C. an Anglo-Australian soil conservation expert, and former wheat and sheep farmer, commented that Italian families 'reformed the whole of the irrigation areas at Shepparton, Swan Hill, Mildura [and] into South Australia' because they brought 'this new force of thinking … across agricultural areas'. John H (introduced above) also remarked that Italian farmers in the Sunraysia were the ones who 'swung over to grow table grapes'. This was clearly influential: the region now grows 75 per cent of Australia's table grapes (Mildura Development Corporation , 2014).

Returning to the aforementioned plastic raincoats (Fig. 3), Maamaloa and Sima are long-term residents of Robinvale, originally from Tonga. Both have extensive experience as grape pickers on the Sunraysia region's farms. They explained, in separate interviews, that the grapevine 'raincoat' innovation came from an Italian farmer called Sam:

> He [Sam] was the first farm here in Robinvale that trialled [it], so it was trial and error … And then all the farmers … took it on board then … because they *saw* the benefit of it … once Sam trialled it and passed it, then all the other farms around here took it on … (Sima, emphasis added).

Don M., himself an Italian migrant, also recounted Sam's contribution: 'Sam was [the first] … it worked for him and then it was like – oh, it was like a bushfire. *Everybody looked*, "Oh!" … Thousands of metres [of plastic sheeting] are bought now' (emphasis added). John C., similarly reflected:

> [P]ost Second World War migration communities … saw an opportunity to grow table grapes … and they went on then to introduce the plastic sheeting for protection and … a whole range of cultural techniques of … handling the bunches on the vine…

He concluded, 'it's worth thinking about how a fruit town like Mildura would survive without immigrants … put it the other way, *how much better we are* because of it (John C. emphasis added).

In all of these examples, access to farmland was critical. It enabled earlier waves of migrants to the Sunraysia region to show their expertise, and to experiment with new techniques as they came to terms with their post-migration environment. Their successes were visible to

[8] Grapes that are dipped in oil and potash dry faster than sun-dried grapes. A hot dip produces dark colored dried fruit.

Fig. 3. Plastic grape 'raincoats' covering grapevines, Sunraysia region (photo taken by Olivia Dun).

others in the region, and this led to the broader uptake of their ideas across the farming community. Many of the farmers interviewed signaled the importance of 'learning over the fence'. In addition to the examples noted above, Chris (an Anglo-Australian pistachio nut farmer) 'learned … budding from a friend up the road'; Brian (an Anglo-Australian wine grape, table grape and citrus grower) commented, 'We're not afraid to copy somebody'; and Steve and Malcolm explained that local members of the Australian Dried Fruits Association learn from one another – including by visiting each other's farms. Anthony, a former table grape farmer, whose grandparents came to Australia from Italy in the 1920s, described 'how much work was involved' in learning how to grow table grapes in the Sunraysia region, because there were 'no scripts … no manuals'. He continued:

> [I]t would have been in the early 70s when that started … they were the years with sharing our knowledge with each other and that's one good thing the Italians are good at, getting in together and … saying "Okay, this is what I did, what did you do?" … it was just like Italians getting together and having a beer at a barbecue, you know, having a pasta night or something like that and before you knew it you had 50, 80 growers there, all sort of working out how are we going to do this and make it better.

Some of our interviewees noted the *particular* benefits that arise when the farmer 'over the fence' originally came from elsewhere. Thus Don M. explained that Italians had learned how to grow tomatoes in the Mildura climate from local Bulgarian farmers; Fiona and her husband Richard met with a local man (originally from Cyprus) when they set up their olive farm – and they still talk to Italian farmers about techniques for growing olives and making olive oil 'because they know more than we do'. Malcolm explained that long-term residence in the area 'is not necessarily an advantage' when it comes to farming. He went on, 'It's an advantage in the fact that you know what you're doing, but it makes it a bit harder to change'.

These observations point towards the potential importance of bridging social capital – and of access to farmland as a means of enacting this potential. But access to farmland is something that most contemporary migrants to the Sunraysia region do not have. The current costs of land and water, and increasing farm sizes, act to exclude more recent arrivals from agricultural land ownership – especially those who come from the Majority World, and/or who came to Australia as refugees. Their food growing skills predominantly take expression in backyard gardens, where they remain relatively hidden from the broader community and largely untapped. The remaining two vignettes engage openly with the possibilities that could emerge through attentiveness to the experimental capacities of recent migrants. We acknowledge that these opportunities have not yet been recognised by many within the region's broader farming community, and our discussion adopts a speculative tone for this reason.

6. Hidden agricultural knowledges: migrants' experimental backyard gardens

Mafu and Emeni are husband and wife. They were both born and raised in Tonga, but met each other while living in New Zealand. They moved to Robinvale in 1994. Mafu grew up on a modest family farm in Tonga, but Emeni was raised on a sizeable plantation. Mafu and Emeni both have extensive farming experience. They helped on their families' farms during their childhoods in Tonga, and have worked on Robinvale's grape farms. For a period of three or four years, Mafu borrowed land from a local Anglo-Australian couple, Brad and Sarah, who have a suburban garden of around three acres. Mafu used this land to grow one acre of sweet potatoes as well as watermelons, tomatoes, corn and taro. He now grows a range of crops, organically, in his and Emeni's own highly productive backyard food garden, including onions, corn, eggplants, tomatoes, capsicums, spring onions and native Australian Lilli Pilli, alongside a range of more tropical crops: bananas, pawpaw, yams and sweet potatoes.

Our interview with Mafu revealed a strong and persistent capacity for experimentation. Learning how to grow pawpaw in Robinvale took many attempts, as the frost prevented the plants from fruiting. Mafu adjusted their location, moving them to a warmer position between the house and the fence. He described rising before sunrise every day to spray the frost off his banana and pawpaw plants – 'because if the sun coming, they touch [the leaves], they burn'. At the time of our interview, Mafu was on the cusp of his first successful pawpaw harvest since arriving in Robinvale and commented: 'How many year[s] I try the pawpaw … but now … they have a fruit'. Mafu has also experimented with growing yams, using sticks to encourage the yam plants to grow 'straight up, because if [they] lie down, they burn in the sun'. The exchange continued:

> Mafu: I put something to grow up straight.
> Emeni: Put a stick there…
> Mafu: Yeah. They go straight up (laughs).
> Olivia: And?
> Mafu: Hey!
> Olivia: Successful?
> Emeni: Yes. Huge.
> Mafu: Yeah, he's a *big one* there…
> Emeni: And I cook in the pot and send to my friend in church to witness … the yam is growing well.

Melly, originally from the Solomon Islands, was another notable backyard experimenter. Melly's backyard garden in Mildura incorporates an incredible diversity of crops, too many to be listed here. She has successfully grown cassava and tapioca, and has developed strategies to protect her taro plants from Mildura's intense heat. After harvesting her sweet potatoes, Melly uses the dead leaves and fibrous roots to surround and protect her taro plants, helping to keep them cool. She described needing to play around with the soil in Mildura (which is very different to what she was accustomed to in the Solomon Islands), and fertilising her plants using the 'traditional way we do it back home'. This involves distributing food scraps (like orange peel and potato peel) mixed with grass around her garden, and leaving the food scraps 'sticking out' so that 'the bird will eat whatever they can and put their drops [droppings], so that's fertilised'.

Our interviews with other backyard food gardeners from Vietnam, Tonga, Burundi and Italy – to name a few – signalled a tenacious capacity to experiment, prompted by a desire to consume foods from their countries of origin. Mafu and Melly both persisted with experimentation until they developed techniques for successfully growing highly

valued cultural crops in their new environment. However, backyard food gardeners' experimental practices take place in private and enclosed spaces and remain relatively hidden from the broader farming community. Few people have insights into these backyard garden spaces. Those who do – like Brad and Sarah, who loaned their land to Mafu and Emeni – readily acknowledge the skills and practices of migrants. Brad described Mafu's garden as 'brilliant' and referred to there being a 'hidden expertise in this place'. Peter and Carolyn (former dried fruit, table grape and citrus farmers) currently work for the local Council, helping older residents with their gardens. This job gives them an unusual level of access to the gardens of diverse residents. They reflected on the particular talents of Vietnamese and Italian food gardeners, with Peter commenting, 'I see around town now, I think, "Gee, how do they do that?" … And they love to tell you … they love to … give their knowledge out … [and] give you some of what they're growing'.

Mafu and Melly's experiences are distinct from those of earlier generations of migrants to the Sunraysia region. Cos's story underscored how the *visibility* of Italian migrants' farming successes drew the attention of the broader community. This resulted in the transfer of knowledge, it created opportunities for learning 'over the fence', from farmer to farmer. In our final vignette, we introduce Joel from Burundi. Joel's story further demonstrates the importance of visibility. It motivated our own efforts to bring landless farmers, and unused farmland, together.

7. A (temporarily) visible crop of African maize, in Merbein

Joel, his wife and their children fled Burundi in 1996 and spent the next eight years living in a refugee camp in neighbouring Tanzania. They were resettled in Australia in 2005 and lived in Sydney, Wollongong and Wagga Wagga before moving to Mildura in 2010. Joel and his wife were farmers in Burundi, and continued to farm while in Tanzania. They grew maize, kidney beans, cassava, bananas, rice and eggplants, among other things. Farming was their living and their way of life. Upon arriving in Australia, Joel didn't particularly enjoy living in an urban area. He found it too hectic and expensive, and longed for room to grow his own food. The promise of fruit picking work, and comparatively cheap housing, lured the family to Mildura. Joel and his wife worked picking grapes and citrus fruits for a couple of years – by which time Joel had attained a cleaning qualification. He now works as a janitor and the family have purchased their own home. Growing food, especially culturally important crops, remains very important to Joel. In fact, he plants white maize alongside kidney beans (both dietary staples in Burundi) on every bit of land available to him, including his family's backyard garden in Mildura and in the grounds of his workplace (with his boss's permission). For three years, Joel grew maize and beans on three acres of borrowed farmland in Merbein. The land was owned by a work colleague, who gave Joel access to the land for free (Joel paid for water use). When we met Joel, in 2014, he took us to see his maize crop in Merbein (Fig. 4). By the time we interviewed him in October 2015, the farm had been sold and the 'borrowing' arrangement had come to an end. He was, once again, a landless farmer.

Fig. 4. Joel's maize, Merbein (photo taken by Olivia Dun).

Joel identifies as a farmer. When we asked him why he decided to settle in Mildura, farming was front and centre of mind: 'I looked around and saw … this town is a town of farmers … The happiest thought was to see the thriving farms. I said: "This place is good for me"'. This sentiment was repeated in seven of the eight interviews that we conducted with members of Mildura's Burundian community. Many expressed a desire to farm in Australia, and – having come from farming backgrounds – possess the requisite knowledge and skills to do so. Jean Paul reflected:

> [I]t is a very big problem that we can't get a place to farm … we have tried to look around to find a place that we could farm as our own … Yeah it has been very hard … [W]hen you plant those crops of yours … when you are weeding, yeah you feel happy, you feel happy because you have a life here in Australia, and you also have your memories of home.

Joel's experience of borrowed farmland provides further evidence that *visibility* opens opportunities for cross-cultural connections and knowledge-sharing:

> Joel: I don't like to praise myself. But I do what I can … because everything is about trying. For instance, in previous years I tried to grow maize, and it thrived … [T]he locals, from here, they were also planting it a little, not much. They noticed a difference. The ones [maize] I planted and the ones they planted were different. And the ones that thrived the most were mine, more than theirs … So they [the local farmers] were thinking … "Why are this person's [maize plants] thriving? How does he do it?" They went there [to the borrowed plot in Merbein], looked around, and checked it out. "Ohhh", they realised … "this expertise is different from ours". Because they … were planting the maize very, very close together, and when the maize sprouts [the plants] usually compete for water and soil … it doesn't thrive well. But me, I was leaving a big space, each plant was independent. It couldn't be crowded by another plant. So that's *when they saw* there's … expertise that we [the Burundians] have … they also realised that, "Aaahh … they have different skills to us" (emphasis added)…
> Natascha: And were those people the owners of the farm or, or of a different farm?
> Joel: They were just strangers, eeh, just passing through.
> Natascha: And they could see straight away that your maize had grown bigger, just by passing by?
> Joel: They were passing by and … they just had to stop … *and look* … Because they won't see another farm like that anywhere around here.

When we asked Joel what he thought local farmers could learn from the Burundian community he replied:

> Eeh especially kidney beans and that maize, that is what they [the local farmers] truly don't know, it really challenges them … I have never seen anyone here who grows maize of this [good] condition. That is as big as this … So if they [the local farmers] *see the way it grows* … they are surprised … People were excited (emphasis added).

When he moved to the Sunraysia region, Joel encountered a growing environment that differed markedly from what he had experienced in Burundi and Tanzania. He found shallower soils, and while he had been accustomed to rain-fed agriculture, in the Sunraysia he had to learn about irrigation. But Joel's farming skills and persistence have enabled him to grow a culturally important crop – to a high standard – in a new and very different land. Like the Italians who preceded him, when Joel had an opportunity to *display* his expertise (albeit, in his

case, temporarily), other farmers observed his skilfulness and enquired about his techniques. By the time we interviewed Joel the plot of land had been sold. Joel's farming skills were once again relatively hidden form the broader farming community. Jean Paul reflected on the challenges that invisibility brings: 'There are people who are … Australians … who also wanted to see how we were farming back home. But because they don't have any land which they can give us, so we can demonstrate to them, it is difficult.'

Joel and other members of Mildura's Burundian community reported prior unsuccessful attempts to obtain farmland for use. They asked us to use our research to intervene, to help raise awareness about their ongoing quest for farmland. This request – coupled with the experimental threads that we have drawn from the literature on climate change adaptation and agriculture, and migration and agriculture – led this research project into an action-oriented phase. Our goal: to match landless farmers with unused farmland. Food Next Door – described below – provides an opportunity to amplify migrants' agricultural knowledges and skills, by helping to make them visible.

8. Bringing migrants' experimental capacities out of hiding: Food Next Door

The vignettes and interview excerpts that we have drawn upon in this paper provide tangible examples of migrants' abilities to introduce new food growing techniques and novel crops to their post-migration contexts. We have presented their experiences – not as examples of adaptive practice *per se* – but for their capacity to shed light on the processes by which migrants' agricultural knowledges gain broader traction in farming communities. Thus, we are not suggesting that Joel's maize and beans; Mafu's pawpaw, yams and sweet potatoes; or Melly's taro, cassava and tapioca present a direct solution to the challenges of climate change in the Sunraysia region. Instead, they signal a tenacious capacity amongst diverse migrants to persist with experimentation. Both experimentation and crop diversity have been identified, in numerous studies, as key resources for climate change adaptation in agriculture. Our contention is that migrants offer a powerful (but typically invisible and underutilised) resource in this regard. Food Next Door provides migrants with access to farmland. In so doing, it creates an opportunity to foster crop and knowledge diversity in a context of pronounced environmental change.

The Food Next Door organisation was formed when we presented our research findings to a group of local stakeholders in Mildura in May 2016, at a workshop jointly hosted with the Sunraysia Mallee Ethnic Communities Council (SMECC) and Mildura Development Cooperation (MDC). Joel was present on the day, as were members of Sunraysia Local Food Future – a not-for-profit movement which aims to strengthen Mildura's local food economy, and to promote 'good, clean and fair food'.[9] This group had received offers of vacant farmland (available for use), while our research findings underscored the Burundian community's wish for farmland. Food Next Door was the outcome of this coming together. Its key objective is to 'make local food visible again' and to connect the local community (including community members from migrant backgrounds) through 'growing, preparing and eating food together'. The Sunraysia Burundian Garden[10] is a pilot project under the broader Food Next Door umbrella, in collaboration with Mildura's Twitezimbere Burundian Community Association and Sunraysia Produce.[11] The latter have made one acre of land available to the project, on a rent-free basis. At the time of writing, 17 members of the local Burundian community were actively involved in the project. Joel has expressed his excitement about the *visibility* of this block of land, which is located on one of Mildura's busiest roads. He is keen for the broader community to witness the Burundian community's agricultural skills, through a highly visible maize crop.

The first crop of maize and beans was planted on this block in September 2016, and harvested in January 2017. Additional larger plots of unused land (from 3 to 20 acres) have been offered to Sunraysia Local Food Future to expand this project, providing scope for larger-scale farming activities involving the Burundian community and other interested migrant groups. Our own ongoing involvement in this 'experiment' is largely in an evaluative capacity. We aim to document and record the various participants' experiences of Food Next Door as it unfolds – paying particular attention to knowledge transfer between emerging migrant communities and established farmers in the region, and to the diversity of crops being introduced. We do not envision this as a formalised scientific experiment, but rather as an opportunity to record observations and see what unfolds, as people 'try something out through experience' (Lane et al., 2011: 24). Food Next Door has created an opportunity to give 'what is nascent and not fully formed some room to move and grow' (Gibson-Graham, 2008: 620; see also Cameron, 2015).

The early signals from the project participants are promising in terms of knowledge exchange. Dean L. is a sixth generation Anglo-Australian grain and livestock farmer in the Sunraysia region. He is a member of Sunraysia Local Food Future and has become involved in the Sunraysia Burundian Garden – lending his tractor, time, farming knowledge and enthusiastic support to the project and to the Burundian farmers. Dean L. described having travelled overseas when he was younger 'to broaden his horizons', travelling on a train through Germany with his 'face pressed against the window and looking at all of the different crops that are grown … and the best practice to do it'. He similarly sees the Sunraysia Burundian Garden as an opportunity to learn. And, while he did not expressly use the term, Dean L. clearly acknowledged the contribution that migration can make to the development of bridging social capital in agricultural contexts:

> I feel like I can learn from the Burundian people. They're growing different … crops than what I'm used to and I've always loved Mildura, and I've always hungered for different aspects of our community, and looking at it through different eyes like those of the Burundian community. Also I can teach them about … differences they mightn't have seen things like agronomy and plant science … *you can always generate greater knowledge through other people's attitudes and opinions* … I get as much out of it as what they do because they're doing it in the soil that I've grown up with so I understand what this soil behaves like, yet they've brought their plants to it. So the plan that's come together has been really nice for that (emphasis added).

Deb, a key member of Sunraysia Local Food Future and Food Next Door made a similar observation:

> Yeah. I think … that we can't change the way we farm without them [migrants] because we're too, um – it's too ingrained – the current farming system's too ingrained and it's controlled by large corporations generally … It's like the potential to change … has to involve new arrivals … there is this, ahh, potential that – you know, we have to work with the new arrivals to change the way that we're doing things.

Already the Sunraysia Burundian Garden has challenged expectations. Di, from Sunraysia Produce (who provided the land) told us that she has been 'fascinated to hear other Aussie growers' opinions on what they [the Burundian community] would be able to do and wouldn't be able to do'. Some of those who stopped at her shop, as the project unfolded, told Di that the Burundians 'would have to poison this and poison that' for the maize crop to grow – especially the 'Johnson grass … which is a very multiplying weed. It multiplies under the ground'. Di continued:

[9] https://www.slowfoodmildura.com.au/what-we-do/food-movement/sunraysia-local-food-future/.

[10] http://www.smeccinc.org/food-next-door—burundian-garden-project.html; https://www.facebook.com/sunraysiaburundiangarden/.

[11] https://www.facebook.com/Sunraysia-Produce-296099537070248/.

> But they [the Burundian community] haven't had to do it because they get out there and work, and it's been interesting to hear other growers that come in here say, "Gosh, look, wow, they've done it", like shock and horrors, you know, without a tractor, without sprays and all that, yeah…

There remains an important caveat. The Food Next Door organisation and the Sunraysia Burundian Garden do not have the explicit goal of contributing to climate change adaptation. The Burundian migrants who are involved in the project want to grow food for their own physical and mental health and wellbeing; to access culturally important crops; to support unemployed or under-employed members of their community; and because many of them identify as farmers and wish to put those skills to use. SMECC's involvement is based around its role in providing resettlement support to migrants and refugees; and Sunraysia Local Food Future and Sunraysia Produce have the shared objective of providing an alternative to the corporate food system, by improving the availability and visibility of locally grown food with minimal artificial chemical inputs. So where does this leave our own research interest in climate change adaptation?

Researchers have often framed climate change adaptation as an intentional act – as something that people (e.g. farm managers/owners) *do* in response to current and predicted climatic stimuli – as 'purposeful, material intervention' (Pelling and High, 2005: 312). However, cultural environmental researchers have argued that climate change adaptation also happens incidentally, as part-and-parcel of everyday life (Crane et al., 2011; Head et al., 2014; Toole et al., 2016) – and we would argue, as part-and-parcel of initiatives like Food Next Door.

Agricultural experimentation is necessary because it is often not possible to know – in advance – which ideas, crops, techniques or technologies will be adaptive; or whose prior experience (with different soils, weather conditions and crop varieties) will come to provide an important resource. When migrants gain access to farmland, through projects such as this one, their practices and crops can add to the suite of options available for an uncertain and challenging future. When viewed through this lens, experimentation takes on a hopeful and open orientation – one that involves looking for 'glimmers of possible worlds' and then seeks to strengthen them (Cameron, 2015: 100; Last, 2012). This approach meshes well with calls to pair climate change adaptation with social justice agendas (Eriksen and Brown, 2011; Hulme, 2011; Rickards et al., 2014; Rickards and Howden, 2012). Food Next Door has the potential to support climate change adaptation – by testing out crops and techniques that are novel for the Sunraysia region – at the same time as it contributes to local food security and sustainability (through low or minimal chemical inputs), and to poverty alleviation and improved wellbeing in migrant and refugee communities.

9. Concluding remarks

> If you really want this place to get going, step out of the way and let some people up the front … And you walk alongside them because they see this place in a totally different light … you know, people like Joel and a lot of the new arrivals that come through, that's what they bring to the community, but a lot of the people here don't understand because it's parochialism that gets in the way and they don't want to let someone else lead the community. But given the opportunity these guys [newer arrivals to the region] will do a great job, I think (Dean Wickham, Executive Officer, SMECC).

When confronted by climate risks, adaptive capacity is supported by 'spaces of complexity and experimentation' (Bardsley and Pech, 2012: 129), and by crop diversity (Eckard et al., 2012; FAO, 2010; Kandulu et al., 2012). Diverse forms and sources of knowledge have been shown to support socio-ecological resilience, by broadening the 'imaginative resources' that are available to a community (Bussey et al., 2012: 385; Calvet-Mir et al., 2016; Dowd et al., 2014; Isaac et al., 2014). This is important in agricultural contexts, because climate change adaptation depends upon 'a constantly changing portfolio of options and actions' to enhance flexibility in the face of unpredictability (Hayman et al., 2012: 209, 210). The literature and empirical evidence that we have corralled in this paper show that migration can contribute to all of these processes. A climate changing present and future poses serious challenges for irrigated horticulture in the Sunraysia region, as it does for other agricultural regions. Migration can offer pockets of diversity (in crops, knowledges and techniques) – even within a broader agricultural landscape that remains dominated by a productivist, neoliberal, monocultural model. Further research will be needed to explore the extent to which the novel potential of migration holds true beyond the first immigrant generation.

Many established farmers have 'strong cultural links' to their existing enterprise – and to particular crops – and these attachments can block change (Brown et al., 2016: 137). Willingness to adopt change often comes about when farmers have seen ('over the fence') that a particular adaptation will be advantageous for them (Brown et al., 2016; Kiem et al., 2010; Kiem and Austin, 2013). When they witness a neighbours' success, change may ensue and spread (or alternatively, they may learn what not to do if a neighbour experiences difficulties). Our contention is simply that when migrants have access to land, they can (and often do) generate *in situ* experiments. Such experimentation expands the portfolio, or toolbox, of options that are 'available and understood' when the need arises (Howden et al., 2014: 87).

At this stage, we are not extending our argument to make a case that governments of countries like Australia, the USA and Canada ought to intentionally recruit agricultural migrants as part of a climate change adaptation strategy. Rather, our contention is that we ought to better understand the skills and capacities of migrants who are already here – and who come from agricultural backgrounds. Diverse knowledges and skills exist in culturally diverse rural communities. But these capacities remain hidden when migrants with farming expertise are restricted to growing food in spaces outside of the broader community's gaze. There is much value in 'surfacing' these resources (Pelling and High, 2005: 314), in amplifying them and making them more visible. We have made a case that this invisibility stems from a lack of access to farmland, and this is certainly a central factor. However, the racialisation of knowledge hierarchies likely also contributes to this process, rendering non-hegemonic experiences 'non-credible', 'non-existent' even (Santos and de Sousa, 2004: 238-9). It may prove harder for Mildura's Burundian community to convince established farmers that they have something useful to offer, than it was for the Italian migrants who preceded them. This dimension requires further investigation as Food Next Door unfolds. There is no doubt that in Australia, as in North America, Majority World migrants who work in the agricultural sector are commonly positioned as labouring bodies. The very policies that bring them to rural areas of these countries cast them as 'unskilled', obfuscating the fact that many carry with them a lifetime of farming experience. The monoculture that we seek to challenge through our own ongoing research, and through our involvement in Food Next Door, is thus a monoculture of both plants and knowledge. This is no trivial task. It requires an expansion of the range of practices acknowledged as being skilful, and of the knowledges deemed worthy of the label expertise.

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